CLAIMS

1. A beam optical component comprising a charged particle lens (1; 1000) for focusing a charged particle beam (3), the charged particle lens (1; 1000) comprising:

   a first element (5; 1005) having a first opening (7) defining a first space through which the charged particle beam (3) can propagate;

   a second element (9; 1009) having a second opening (11) defining a second space through which the charged particle beam (3) can propagate; and

   first driving means (13) coupled to at least one out of the first element (5; 1005) and the second element (9; 1009) for aligning the first opening (7) with respect to the second opening (11).

2. The beam optical component according to claim 1, whereby the charged particle lens (1; 1000) comprises a third element (25) having a third opening (27) for focussing the charged particle beam (3).

3. The beam optical component according to any one of the preceding claims, whereby the geometry of the first, second or third opening (7; 11; 27) defines a respective first, second or third central axis (47).

4. The beam optical component according to claim 3, whereby the first driving means (13; 13x; 13y; 13z) are capable of aligning the first and second central axes (47) to a common symmetry axis (15) .

5. The beam optical component according to any one of the preceding claims, whereby the first driving means (13; 13x; 13y; 13z) are capable of aligning first and second elements (5; 7) to be coaxially or parallel aligned.

6. The beam optical component according to any one of the preceding claims, whereby the charged particle lens (1; 1000) comprises second driving means (42) coupled to at least one of the second element (9) and the third element (25) for aligning the second opening (11) with respect to the third opening (27).

7. The beam optical component according to claim 6, whereby the second driving means (42) are capable of aligning the second and third central axes (47) to a common symmetry axis (15) .

8. The beam optical component according to any one of the preceding claims, comprising a charged particle beam source (62).

9. The beam optical component according to claim 8, whereby the charged particle beam source (62) comprises an extracting electrode (60) for extracting charged particles into a vacuum.

10. The beam optical component according to any one of the preceding claims, whereby at least one out of the first, second and third elements (5; 7; 25) is an electrode for focussing the charged particle beam (3).

11. The beam optical component according to any one of the claims 2 to 10, whereby the third electrode (25) is positioned such as to serve as an extracting electrode (60).

12. The beam optical component according to any one of the claims 8 to 11, whereby at least one out of the first, second and third element (5; 9; 25) is shaped and positioned with respect to the charged particle beam source (62) to serve as a beam aperture (50) for the charged particle beam (3).

13. The beam optical component according to any one of the preceding claims, whereby at least one out of the first and second driving means (13; 13x, 13y; 13z; 42) is capable of moving the respective first or second element (5; 9) in a first direction laterally to their respective first or second central axes (47) .

14. The beam optical component according to any one of the preceding claims, whereby at least one out of the first and second driving means (13; 42) is capable of moving the respective first or second element (5; 9) in a second direction perpendicular to the respective first or second central axis (47) and, preferably, perpendicular to the first direction.

15. The beam optical component according to any one of the preceding claims, whereby at least one out of the first and second driving means (13; 42) is capable of moving the respective first or second element (5; 9) into the directions of the respective first or second central axis (47).

16. The beam optical component according to any one of the preceding claims, whereby at least one out of the first and second driving means (13; 42) is capable of moving the respective first or second element (5; 9) at a spatial resolution of better than 10 micrometers, preferably better than 1 micrometer and even more preferred of better than 100 nm.

17. The beam optical component according to any one of the preceding claims, whereby the charged particle lens (1; 1000) comprises at least one out of the first and second measuring means (30; 70) to measure the actual location of the respective first or second opening (7; 11) with respect to the second or third opening (11; 27).

18. The beam optical component according to any one of the preceding claims, whereby the charged particle lens (1; 1000) comprises electronic connections (38a; 38b; 38c) between at least one out of the first and second measuring means (30; 32) and the respective first or second driving means (13; 42) for feeding information of the measured location of the first or second opening (7; 11) to the first or second driving means (13; 42) to adjust the actual location to a desired location.

19. The beam optical component according to any one of the preceding claims, whereby at least one out of the first and second driving means (13; 42) are remotely controllable.

20. The beam optical component according to any one of the preceding claims, whereby at least one out of the first and second driving means (13; 42) comprises a precision motor drive, a stepping motor, a DC-motor, or a piezo-motor.

21. The beam optical component according to any one of the preceding claims, whereby at least one out of the first and second electrodes (5; 9) is shaped to comprise multiple openings (7a; 7b; 7c) for focussing the charged particle beam (3).

22. The beam optical component according to claim 21, whereby at least one out of the first and second electrodes (5; 9) is shaped and positioned to provide that the distance of at least one of the multiple openings (7a, 7b; 7c) to an opening (11; 27) of an adjacent second or third electrode (9; 25) in axial direction is larger by at least ten percent compared to the distance in axial direction of at least one of the other of the multiple openings (7a; 7b; 7c) to said opening (11; 27).

23. The beam optical component according to claim 21 or 22, whereby at least one out of the first and second electrodes (5; 9) is shaped such that a thickness of the rim (8; 8a; 8b; 8c) of at least one of the multiple openings (7a, 7b; 7c) is larger by at least a factor of two compared to a thickness of the rim (8; 8a; 8b; 8c) of at least one of the other multiple openings (7a; 7b; 7c) of said electrode.

24. The beam optical component according to any one of the claims 21 to 23, whereby at least two of the multiple openings (7a, 7b; 7c; 11a; 11b) of the first or second electrode (5; 9) have essentially the same size.

25. The beam optical component according to any one of the preceding claims, whereby at least one out of the first, second and third openings (7; 11; 27) is rotationally symmetric with respect to its central axes (47).

26. The beam optical component according to any one of the preceding claims, whereby at least one out of the first, second and third openings (7; 11; 27) is rectangularly shaped.

27. The beam optical component according to any one of the claims 2 to 26, whereby the charged particle lens (1; 1000) comprises at least one distance piece (40) between the second element (9) and the third element (25) to provide for a minimum distance between said second element 9 and said third element 25.

28. The beam optical component according to claim 27, whereby the charged particle lens (1; 1000) comprises at least one holding piece (53; 57) for abutting the second element (9) to the at least one distance piece (40), whereby the first holding piece is attached to the at least one distance piece.

29. The beam optical component according to any one of the claims 27 or 28, whereby the distance piece (40) is spherical.

30. The beam optical component according to any one of the claims 2 to 29, whereby the first or second driving means (13, 42) are connected to at least two of the first, second and third electrode (5, 9, 25).

31. The beam optical component according to any one of the claims 2 to 30, whereby the charged particle lens (1; 1000) comprises more than three elements that each have an opening for focussing the charged particle beam (3);

32. The beam optical component according to any one of the claims 6 to 31, whereby the charged particle lens (1; 1000) comprises more than two driving means that are connected with the third element or one of the more than three elements;

33. The beam optical component according to any one of the claims 6 to 32, whereby at least one out of the first and second openings (7, 11) is smaller than the third opening (27) by a factor of two, preferably by a factor of ten and even more preferred by a factor of 50.

34. A charged particle beam device for focussing a charged particle beam onto a specimen (17) comprising a beam optical component (1; 1000) according to any one of the preceding claims.

35. The charged particle beam device according to claim 34 comprising in addition:

a specimen holder (19) to hold the specimen (17) for inspecting or structuring the specimen; and

a beam aperture to limit the aperture angle of the charged particle beam for inspecting or structuring the specimen (17).

36. The charged particle beam device according to any one of the claims 34 to 35 whereby the beam optical component (1; 1000) is positioned between the specimen holder (19) and the beam aperture to focus the charged particle beam (3) onto the specimen (17).

37. The charged particle beam device according to any one of the claims 34 to 36 comprising an objective lens and a charged particle beam source.

38. The charged particle beam device according to any one of the claims 34 to 37 whereby the beam optical component is positioned between the objective lens and the charged particle beam source.

39. Method of aligning a first opening (7) of a first element (5) with respect to a second opening (11) of a second element (9) for focussing a charged particle beam (3) onto a specimen (17) with the steps:

a) providing a beam optical component according to any one of the claims 1-33;

b) scanning the charged particle beam (3) across the specimen (17) to generate a first image of the specimen (17) with a first set of voltages applied to the first element (5) and the second element (9) of the beam optical component;

c) scanning the charged particle beam (3) across the specimen (17) to generate a second image of the specimen (17) with a second set of voltages applied to at least

one out of the first element (5) and the second element (9) of the beam optical component;

d) moving the first element (5) with respect to the second element (9); and

e) repeating steps c), d) and e) until at least one structure element of the specimen (17) identified in the first image is identified in the second image.

40. The method according to claim 39 comprising the step of moving the second element (9) with respect to a third element (25) until at least one structure element of the specimen (17) identified in the first image is identified in the second image.

41. The method according to any one of the claims 39 to 40 whereby the first set of voltages and the second set of voltages are the same for at least one of the first, second and third elements.

42. The method according to any one of the claims 39 to 41 whereby at least one out of the first, second and third elements (5; 9; 25) is an electrode.

43. The method according to any one of the claims 39 to 42 whereby charged particle beam (3) is generated by a charged particle beam device according to any one of the claims 34-38.